

REMARKS

The Office Action of March 12, 2007 was received and carefully reviewed. Reconsideration and withdrawal of the currently pending rejections are requested for the reasons advanced in detail below.

Claims 1-4, 6-10, 12-16, 18-22, 24-28, 30-34 and 36 were pending prior to the instant amendment. By this amendment, claims 37-54 have been added. Consequently, claims 1-4, 6-10, 12-16, 18-22, 24-28, 30-34, 36, and 37-54 are currently pending in the instant application.

Claims 1-36 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-27 of U.S. Patent No. 6,706,568. A terminal disclaimer in compliance with 37 CFR 1.321 (c) is submitted herewith to overcome the double patenting rejection. Accordingly, Applicant respectfully requests withdrawal of the rejection.

Applicant initially thanks the Examiner for the telephone interview held on June 27, 2007. During the interview, it was pointed out to the Examiner that while *Nitta et al.* disclosed components of a device which included a semi conductor substrate 1 and a plurality of resonator type laser diodes 52, 53, and 54 (e.g., see FIG. 12), *Nitta et al.* did not disclose or fairly suggest the claimed method of manufacturing the semiconductor device as recited in Applicant's claims. Thus, the Examiner does not appear to fully appreciate the claimed manufacturing steps in order to generate the semiconductor device.

Turning, for example, to the outstanding Office Action, claim 1 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nitta et al.* (US 6,304,329 B1) in view of *Ouderkrik et al.* (US 4,879,176). *Nitta et al.* in view of *Ouderkrik et al.*, however, fail to render the claimed invention unpatentable. The claim recites a specific combination of

features that distinguishes the invention from the prior art in different ways. For example, independent claim 1 recites a combination that includes, among other things:

forming a semiconductor film over an insulating surface . . . forming an oxide film on the semiconductor film . . . radiating the semiconductor film with a first laser beam using a lens . . . radiating the semiconductor film with a second laser beam after radiating with the first laser beam . . . radiating the semiconductor film with a third laser beam after radiating with the second laser beam . . . wherein a wavelength of the second laser beam and a wavelength of the third laser beam are different from a wavelength of the first laser beam,

(claim 1, ll. 3-11). At the very least, the applied references, whether taken alone or in combination, fail to disclose or suggest any of these exemplary features recited in independent claim 1.

The Examiner has failed to establish a *prima facie* case of obviousness for at least four reasons. First, the Examiner has not demonstrated how *Nitta et al.* and *Ouderkrik et al.* whether taken alone or in combination, disclose or suggest each and every feature recited in the claims. *See* M.P.E.P. § 2143 (7th ed. 1998). Second, the Examiner has not shown the existence of any reasonable probability of success in modifying *Nitta et al.*, the base reference, based on the teachings of *Ouderkrik et al.*, the secondary reference, in a manner that could somehow result in the claimed invention. *See id.* Third, the Examiner has not identified any suggestion or motivation, either in the teachings of the applied references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the apparatus of *Nitta et al.* in a manner that could somehow result in the claimed invention. *See id.* Finally, the Examiner has not explained how his obviousness rationale could be found in the prior art — rather than being a hindsight reconstruction of Applicants' own disclosure. *See id.*

Each of the Examiner's factual conclusions must be supported by "substantial evidence" in the documentary record, as required by the Federal Circuit. *See In re Lee*, 61 U.S.P.Q.2d 1430, 1435 (Fed. Cir. 2002). The Examiner has the burden of documenting all findings of fact necessary to support a conclusion of anticipation or obviousness "less the 'haze of so-called expertise' acquire insulation from accountability." *Id.* To satisfy this burden, the Examiner must specifically identify where support is found within the prior art to meet the requirements of 35 U.S.C. §§ 102(b) and 103. In this case, however, the Examiner has failed to satisfy his burden of demonstrating how *Nitta et al.*, taken alone or in combination with *Ouderkrik et al.*, can either anticipate or render obvious each and every one of the limitations present in independent claim 1, as required by the M.P.E.P. and Federal Circuit jurisprudence.

Nitta et al. discloses a gyro and a semiconductor device having a plurality of laser diodes. In accordance with the abstract of *Nitta et al.*, "the gyro has a ring resonator type laser diode, and which detects a beat signal attendant on rotation, a plurality of laser diodes are disposed on an identical substrate, thereby to exhibit a wide detection range for angular velocities. A semiconductor device includes a plurality of ring resonator type laser diodes, each of which undergoes a voltage change or a change in a driving current in attendance on a magnitude of an applied angular velocity when subjected to constant-current drive, and which are disposed in a single frame or on a single substrate. In the semiconductor device, the ring resonator type laser diodes may be disposed on an identical surface of the single substrate."

While the device of *Nitta et al.* employs components including, for example, a semiconductor substrate 1 and first, second and third ring resonator type laser diodes 52, 53 and 54, *Nitta et al.*, does not disclose or fairly suggest the method of manufacturing a semiconductor device as recited in claim 1. For example, the Examiner alleges that items 52,

53 and 54 of *Nitta et al.* are laser beams irradiating a semiconductor film. However, features 52, 53 and 54 (such as shown in FIG. 12) of *Nitta et al.* are laser diodes (also called semiconductor lasers) that are provided in order to detect the angular velocity of other objects. Furthermore, the disclosed laser diodes of *Nitta et al.* are specifically utilized in a ring resonator in a gyro(e.g., see col. 12, lines 24-29); thus, the device of *Nitta et al.* is not in the same field of endeavor as claimed by Applicant. Furthermore, *Nitta et al.* does not disclose or fairly suggest “radiating the semiconductor film with a first laser beam using a lens . . . radiating the semiconductor film with a second laser beam after radiating with the first laser beam . . . radiating the semiconductor film with a third laser beam after radiating with the second laser beam, wherein a wavelength of the second laser beam and a wavelength of the third laser beam are different from a wavelength of the first laser beam,” as recited in claim 1. *Nitta et al.* merely discloses how the laser diodes 52, 53 and 54 are made (e.g., see steps 1 through 5 at col. 8, lines 13-35). In addition, *Nitta et al.* does not disclose or fairly suggest, the steps of “forming a semiconductor film over an insulating surface . . . forming an oxide film on the semiconductor film,” in combination with the other recited features of claim 1.

In addition, the Examiner contends that *Nitta et al.* discloses at col. 8, lines 5-12, methods of using a semiconductor laser for growing crystals by radiating laser beam on the semiconductor to crystallize the crystal and further alleges this is the same as Applicant’s description in the specification (e.g., see page 16, third paragraph, of the Office Action). However, it appears the Examiner has not understood the teachings of *Nitta et al.* at col. 8, lines 5-12, since *Nitta et al.* appears to merely disclose that techniques for forming the semiconductor laser of the prior art may also be used as techniques for forming the layer configuration of the device of *Nitta et al.* *Nitta et al.* never discloses that the laser diodes

(semiconductor lasers) are used for growing crystals. Rather, *Nitta et al.* discloses that techniques for crystal growth used to form prior-art semiconductor lasers may also be used to form the layer configuration of the device of *Nitta et al.* Moreover, *Nitta et al.* also never discloses crystal growth by radiating a laser beam on a semiconductor as alleged by the Examiner. On the contrary, *Nitta et al.* merely discloses at col. 8, lines 13-16, "(c)rystal growth is executed on a semiconductor substrate so as to obtain the layer configuration shown in FIG. 2, by the existing crystal growth technique such as MOCVD"

Additionally, the Examiner further asserts that Applicant has not understood the teachings of *Nitta et al.* at col. 8, lines 54-57 and col. 9, lines 26-34. However, upon further review of *Nitta et al.*, the teachings at col. 8, line 5 through col. 9, line 36, appear to only disclose **known** techniques for forming a semiconductor laser of the **prior art** which may also be used as techniques for forming the layer configuration of the device of *Nitta et al.*, as similarly discussed above.

In the outstanding Office Action, the Examiner readily admits that *Nitta et al.* fails to disclose radiating a semiconductor film with a first laser beam using a lens as claimed by Applicant. The Examiner attempts to remedy the deficiencies of *Nitta et al.* by turning to *Ouderkrick et al.* (e.g., col. 17, lines 1-5), alleging that it would have been obvious to one skilled in the art at the time of the invention to include *Ouderkrick et al.*'s step of radiating a semiconductor film with a first laser beam using a lens in order to control the exposed area of the sample and thus the energy density of the beam striking the sample.

However, *Ouderkrick et al.* discloses a method for surface modification of semicrystalline **polymeric** materials (not semiconductor films) to form a quasi-amorphous layer by radiation, while the present invention is directed to a method for manufacturing a semiconductor device by radiating a semiconductor film with laser beams; therefore, the

invention of *Ouderkrirk et al.* is not of the same technical field of endeavor as claimed by Applicant.

Furthermore, not only are *Nitta et al.* and *Ouderkrirk et al.* of different technical fields from the present invention, *Nitta et al.* and *Ouderkrirk et al.* are also of different technical fields from each other. While *Nitta et al.* discloses a gyro having a plurality of laser diodes which have a wide detection range for angular velocities, *Ouderkrirk et al.* discloses a method for surface modification of semicrystalline polymeric materials to form a quasi-amorphous layer by radiation. Therefore, no proper motivation exists to combine a method of surface modification by radiating a semicrystalline polymeric material with a first laser beam using a lens as taught by *Ouderkrirk et al.* in a gyro having laser diodes for detecting an angular velocity having a wide detection range as taught by *Nitta et al.*

Not only is the Examiner's motivation to combine *Nitta et al.* and *Ouderkrirk et al.* improper, but it appears that the gyro having laser diodes for detecting an angular velocity as taught by *Nitta et al.* would be inoperable if combined with the lens of *Ouderkrirk et al.* for radiation of a semicrystalline polymeric material. Thus, the Examiner has not shown the existence of any reasonable probability of success in modifying *Nitta et al.*, the base reference, based on the teachings of *Ouderkrirk et al.*, the secondary reference, in a manner that could somehow result in the claimed invention in accordance with the M.P.E.P.

In accordance with the M.P.E.P. § 2143.03, to establish a *prima facie* case of obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 409 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 196 (CCPA 1970). Therefore, it is respectfully submitted that neither *Nitta et al.* nor *Ouderkrirk et al.*, taken alone or in any proper

combination, discloses or suggests the subject matter as recited in claim 1. Hence, withdrawal of the rejection is respectfully requested.

Claims 2-4, 6, and 37-39 depend from independent claim 1 and are patentable over the cited prior art for at least the same reasons as set forth above with respect to claim 1.

In addition, each of the dependent claims also recite combinations that are separately patentable.

Claims 2-3, 7-9, 13-15, 25-28, and 31-33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nitta et al.* (US 6,304,329 B1), as applied to claim 1, and further in view of *Miyanaaga et al.* (US 5,808,321)¹. *Nitta et al.* in view of *Miyanaaga et al.*, however, fail to render the claimed invention unpatentable. The claims recite specific combinations of features that distinguish the invention from the prior art in different ways. For example, independent claim 7 recites a combination that includes, among other things:

forming a semiconductor film over an insulating surface . . . forming an oxide film on the semiconductor film . . . radiating the semiconductor film with a first laser beam . . . radiating the semiconductor film with a second laser beam after radiating with the first laser beam under an atmosphere comprising one of hydrogen and an inert gas . . . radiating the semiconductor film with a third laser beam after radiating with the second laser beam . . . wherein a wavelength of the second laser beam and a wavelength of the third laser beam are different from a wavelength of the first laser beam,

(claim 7, ll. 3-11). Independent claim 13 recites yet another combination that includes, *inter alia*,

forming a semiconductor film over an insulating surface . . . forming an oxide film on the semiconductor film . . . radiating the semiconductor film with a first laser beam . . . radiating the semiconductor film with a second laser beam after radiating with the first laser beam . . . radiating the semiconductor film with a third laser beam after radiating with the second laser beam under an atmosphere comprising one of hydrogen and an inert gas, wherein a

¹ (Please note that "*Mitanaaga*" was corrected to "*Miyanaaga*" according to the Certificate of Correction issued by the USPTO on August 10, 1999.)

wavelength of the second laser beam and a wavelength of the third laser beam are different from a wavelength of the first laser beam.

(claim 13, ll. 3-11). Independent claim 25 recites a further combination that includes, for instance,

forming a semiconductor film over an insulating surface . . . forming an oxide film on the semiconductor film . . . radiating the semiconductor film with a first laser beam . . . radiating the semiconductor film with a second laser beam after radiating with the first laser beam . . . radiating the semiconductor film with a third laser beam after radiating with the second laser beam, wherein an energy of the third laser beam is higher than an energy of the first laser beam, and wherein a wavelength of the second laser beam and a wavelength of the third laser beam are different from a wavelength of the first laser beam.

(claim 25, ll. 3-13). And independent claim 31 recites a further combination that includes, for instance,

forming a semiconductor film over an insulating surface . . . forming an oxide film on the semiconductor film . . . crystallizing the semiconductor film by a heat treatment to form a crystallized semiconductor film . . . radiating the crystallized semiconductor film with a first laser beam . . . radiating the crystallized semiconductor film with a second laser beam after radiating with the first laser beam . . . radiating the crystallized semiconductor film with a third laser beam after radiating with the second laser beam, wherein a wavelength of the second laser beam and a wavelength of the third laser beam are different from a wavelength of the first laser beam.

(claim 31, ll. 3-13). At the very least, the applied references, whether taken alone or in combination, fail to disclose or suggest any of these exemplary features recited in independent claims 7, 13, 25, and 31.

Nitta et al. fails to disclose or fairly suggest the claimed features recited in the independent claims for, at least, the same reasons as discussed above. *Miyanaga et al.* is directed to a semiconductor device with a recrystallized active area. Upon additional review of *Miyanaga et al.*, it, too, fails to cure the deficiencies of *Nitta et al.* More specifically, there is simply no disclosure of the method for manufacturing a semiconductor device as recited in

Applicant's independent claims 7, 13, 25, and 31.

Dependent claims 2, 8, 14, and 26 recite a further combination that includes, for instance,

crystallized semiconductor film is formed after radiating the semiconductor film with the first laser beam.

And independent claim 32 recites a further combination that includes, for instance,

a crystallized semiconductor film having improved crystal characteristics is formed after radiating the semiconductor film with the first laser beam

At the very least, the applied references, whether taken alone or in combination, fail to disclose or suggest any of these exemplary features recited in dependent claims 2, 8, 14, 26, and 32.

The Examiner admits that *Nitta et al.* fails to disclose laser treatment for the purpose of forming a crystallized semiconductor film. For the missing feature, the Examiner turns to *Miyanaga et al.* (col. 1, lines 20-25 and 45-47 and col. 2, lines 10-18), alleging that it would have been obvious to one of ordinary skill in the art at the time of invention to use the laser annealing of *Miyanaga et al.* in the device of *Nitta et al.* and further alleging that one would be motivated to do so in order to crystallize the semiconductor film at low temperature so as to avoid substrate deformation and reduce the heating time from several ten hours or more necessary for crystallization to about an hour and produce a product having the desired properties.

It is noted that the disclosed inventions of *Nitta et al.* and *Miyanaga et al.* are of different technical fields from each other. The Examiner, thus has not provided proper motivation to combine the laser annealing method *Miyanaga et al.* for crystallizing a semiconductor film at low temperature so as to avoid substrate deformation and reduce the

heating time from several ten hours or more necessary for crystallization to about an hour and produce a product having the desired properties in the gyro of *Nitta et al.* having laser diodes for detecting an angular velocity having a wide detection range.

Not only is the Examiner's motivation to combine *Nitta et al.* and *Miyanaga et al.* improper, but it appears that the gyro having laser diodes for detecting angular velocity as taught by *Nitta et al.* would be inoperable if combined with the laser annealing method of *Miyanaga et al.* for crystallizing a semiconductor film.

In accordance with the M.P.E.P. § 2143.03, to establish a *prima facie* case of obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 409 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 196 (CCPA 1970). Therefore, it is respectfully submitted that neither *Nitta et al.* nor *Miyanaga et al.*, taken alone or in any proper combination, discloses or suggests the subject matter as recited in the claims. Hence, withdrawal of the rejection is respectfully requested.

In addition, each of the dependent claims also recite combinations that are separately patentable.

Claims 4, 6, 10, 12, 18-22, 24, 30, 34 and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nitta et al.* (US 6,304,329 B1) in view of *Miyanaga et al.* (US 5,808,321)² and further in view of *Ouderkrik et al.* (US 4,879,176). *Nitta et al.* in view of *Miyanaga et al.* and further in view of *Ouderkrik et al.*, however, fail to render the claimed invention unpatentable. The claims recite specific combinations of features that distinguish

² (Please note that "*Mitanaga*" was corrected to "*Miyanaga*" according to the Certificate of Correction issued by the USPTO on August 10, 1999.)

the invention from the prior art in different ways. *Nitta et al.* fails to disclose or fairly suggest the claimed features recited in the independent claims for, at least, the same reasons as discussed above. *Miyanaga et al.* and *Ouderkrik et al.* fail to cure the deficiencies of *Nitta et al.* also for the reasons discussed above. In addition, each of the references are of different technical fields from each other. Thus, the Examiner, has not provided proper motivation to combine the references at least for the reasons as outlined above. Finally, it also appears that the Examiner has not shown the existence of any reasonable probability of success in modifying the cited prior art combination in a manner that could somehow result in the claimed invention in accordance with the M.P.E.P.

In accordance with the M.P.E.P. § 2143.03, to establish a *prima facie* case of obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 409 F.2d 981, 180 USPQ 580 (CCPA 1974). “All words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 196 (CCPA 1970). Therefore, it is respectfully submitted that neither *Nitta et al.*, *Miyanaga et al.*, nor *Ouderkrik et al.*, taken alone or in any proper combination, discloses or suggests the subject matter as recited in the claims. Hence, withdrawal of the rejection is respectfully requested.

In addition, each of the dependent claims also recite combinations that are separately patentable.

Newly added claims depend from one of independent claims 1, 7, 13, 19, 25, and 31 and are patentable over the cited prior art for at least the same reasons as set forth above with respect to claims 1, 7, 13, 19, 25, and 31.

In view of the foregoing remarks, this claimed invention, as amended, is not rendered obvious in view of the prior art references cited against this application. Applicant therefore

request the entry of this response, the Examiner's reconsideration and reexamination of the application, and the timely allowance of the pending claims.

In discussing the specification, claims, and drawings in this response, it is to be understood that Applicant in no way intends to limit the scope of the claims to any exemplary embodiments described in the specification and/or shown in the drawings. Rather, Applicant is entitled to have the claims interpreted broadly, to the maximum extent permitted by statute, regulation, and applicable case law.

Should the Examiner believe that a telephone conference would expedite issuance of the application, the Examiner is respectfully invited to telephone the undersigned patent agent at (202) 585-8316.

In view of the foregoing, it is respectfully submitted that the claims are allowable over the cited prior art and it is requested that the rejections and warning of record be reconsidered and withdrawn by the Examiner, that the pending claims be allowed and a notice of allowance issued.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read 'Marc W. Butler', is written over a horizontal line.

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